Amendments to the Specification:

1. Page 1, before line 4 but after the title, please insert the following:

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a U.S. National Stage of International Application No. PCT/EP2005/002795, filed March 16, 2005, which claims priority of German Patent Application No. 10 2004 012 977.0, filed March 17, 2004.

BACKGROUND OF THE INVENTION

1. Field of the Invention

2. Page 1, before line 9, please insert the following:

2. Discussion of Background Information

3. Page 2, before line 1, please insert the following:

SUMMARY OF THE INVENTION

The present invention provides a process for the production of a crystalline substrate with an optical multi-layer system thereon. The process comprises:

(a) the application of a first free-flowing composition which comprises nanoscale inorganic solid particles comprising a polymerizable and/or

polycondensable organic group to at least one surface of the crystalline substrate;

(b) the polymerization and/or polycondensation of the organic groups of the solid particles to form a first organically crosslinked layer on the at least one surface;

(c) the application of a second free-flowing composition which comprises nanoscale inorganic solid particles comprising a polymerizable and/or polycondensable organic group to the organically crosslinked layer of (b), the second composition giving rise to a different refractive index than the first composition;

(d) the polymerization and/or polycondensation of the organic groups of the solid particles of the applied second composition to form a second organically crosslinked layer on the first organically crosslinked layer;

(e) optionally, the application of a further free-flowing composition which comprises nanoscale inorganic solid particles comprising a polymerizable and/or polycondensable organic group to the organically crosslinked layer of (d) and the polymerization and/or polycondensation of the organic groups of the solid particles of the further composition to form a further organically crosslinked layer on the second organically crosslinked layer;

(f) optionally, repeating (e) one or more times to form one or more further organically crosslinked layers; and

(g) a single-stage thermal consolidation of the organically crosslinked layers present and the burnout of organic constituents thereof;

with the proviso that for the uppermost layer,

(1) the polymerization and/or polycondensation of the organic groups of the solid particles of the applied composition to form an organically crosslinked layer may optionally be effected concurrently with (g) or

(2) alternatively and optionally, the nanoscale inorganic solid particles do not comprise a polymerizable or polycondensable organic group, so that, in this case, for the uppermost layer, a polymerization or polycondensation of groups of the solid particles with formation of organic crosslinking does not take place before or during (g).

In one aspect of the process, one or more organically crosslinked layers may be formed at a temperature of up to about 150°C, for example, at a temperature of up to about 130°C. In another aspect, they may be formed by photochemical polymerization and/or polycondensation.

In another aspect of the process of the present invention, (g) may be carried out at a temperature of from 400°C to 800°C, for example, at a temperature of from 400°C to 600°C. In yet another aspect, (g) may be carried out in such a way that the heating of the crosslinked layer(s) is effected from outside inward in a direction toward the crystalline substrate. In a still further aspect, the heating rate of the crosslinked layer(s) in (g) may be at least 100°K/min.

In another aspect of the process of the present invention, the nanoscale particles may comprise one or more compounds selected from semimetal and metal compounds. For example, the nanoscale particles may comprise one or more compounds selected from oxides, sulfides, selenides and tellurides of semimetals and metals such as, e.g., one or more compounds selected from SiO_2, TiO_2, ZrO_2, ZnO, Ta_2O_5, SnO_2 and Al_2O_3.

In another aspect of the process, the polymerizable or polycondensable organic groups may comprise organic radicals which comprise a (meth)acryloyl group, a vinyl group, an allyl group and/or an epoxy group.

In a still further aspect, the solid particles may have been produced by surface modification of nanoscale solid particles to provide them with polymerizable or polycondensable organic groups, or the solid particles may have been produced from at least one compound that comprises a polymerizable and/or polycondensable group. Still further, the inorganic solid particles may have been produced by the sol-gel process.

In yet another aspect, at least one of the first and second compositions may have a pH of from 3 to 8.

The present invention also provides a crystalline substrate with an optical multi-layer system thereon, which substrate is obtainable by the process set forth above, including the various aspects thereof.

In one aspect, the crystalline substrate may comprise one or more of silicon, lithium niobate, lithium tantalate, quartz, sapphire, PbS and selenium.

In another aspect, the crystalline substrate may comprise a precious stone and/or a semi-precious stone.

In yet another aspect, the crystalline substrate may be planar. In another aspect, it may be curved.

In a still further aspect, the substrate may be transparent.

In another aspect, two sides of the substrate may be provided with an optical multi-layer system.

In another aspect, the crystalline substrate may comprise one or more of a sheet, a watchglass, an instrument cover glass, a wafer, a crystalline detector and an optical filter. For example, it may comprise a sheet of sapphire, a watchglass of sapphire and/or a silicon wafer.

In yet another aspect of the substrate, the optical multi-layer system may comprise an interference layer system, for example, an antireflection layer system.

DETAILED DESCRIPTION OF THE INVENTION